

Water Utility Program (WatUP) Mapping and Database Standard DRAFT 1.0	Document Number: SS-xx-xxx (I'll give you this number)
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1.0 Purpose

This standard is intended to make service area and water main mapping and attribute databases more uniform and accurate. This will facilitate the sharing of a statewide, seamless service area and water main spatial data layers. Adherence to these standards will ensure the “usability” of the spatial data theme and its attributes by multiple entities. This standard will insure a consistent manner in which the service area and water main spatial data and/or attribute data are collected. This will enable the data to be merged seamlessly and become transferable regardless of creator or jurisdictional boundaries.

2.0 Scope

Provide a standard that will enable the seamless compilation of water utility service areas and water mains statewide.

3.0 Background

The State Land Information Board (SLIB) was created by Act 914 of the 1997 General Assembly and is responsible for:

- 3.1 Identifying problems and solutions in implementing a spatial data repository
- 3.2 Developing and coordinating a schedule for state spatial data projects
- 3.3 Recommending methods of financing for state spatial data projects
- 3.4 Providing educational programs that are focused on spatial data technologies
- 3.5 Coordinating collaborative projects
- 3.6 Establishing spatial data standards (Section 4. (f) (1) of Arkansas Code 15-21-5).
Arkansas Code 15-21-5 An Act to Amend the Arkansas Code to Create the Geographic Information Office and Establish the Arkansas Spatial Data Infrastructure and for other purposes establishes these SLIB principles:
- 3.7 Validity, consistency, comprehensiveness, availability, and currency of data are essential components of all automated land information systems.

- 3.8 Coordination with federal, state, regional, county, and municipal agencies, state universities and colleges, private firms, and others who require the same spatial data will reduce duplication of efforts and expense.
- 3.9 Creation of new data in an accurate and usable format in accordance with the states shared technology architecture will ensure availability across state agencies.

4.0 References

Arkansas Code 15-21-5

5.0 Standard

Technical Practices for Creating Service Area and Water Main Features

Service Area and Water Main Feature Types:

Vector lines and polygons shall be used to represent service area and/or water main features. The vector features must be reference to the proper Arkansas State Plane Zone, North American Datum 1983 (NAD83), and units shall be feet. The feature types used to model service area and water main shall be consistent and shall “seamlessly” match across jurisdiction boundaries (i.e. cities, counties, etc.).

All service area and water main features shall be compiled using appropriate procedures and software to create and maintain proper topology, relationship classes and be capable of relating attribute tables.

Digital Map Compilation:

Map features intended to meet the standard may be produced utilizing heads-up digitizing techniques. Heads-up digitizing should be performed utilizing the following standards:

Capture scale should not fall outside the range of 1:1200 to 1:3600

Projection- Arkansas State Plane North/South

Datum- North American Datum 1983 (NAD 83)

Units- Feet

Source- Orthorectified imagery that has a verified minimum of 10 meters horizontal accuracy at a 95% confidence level tested using the National Spatial Data Accuracy Standards (NSSDA).

Heads-up digitizing method should only be used where clear visual ground evidence of the feature is present on the imagery.

A mapping grade Global Positioning System (GPS) receiver may also be used to collect map features following the State of Arkansas GPS standards/rule and regulation. GPS data should be real-time corrected and post processed/differentially corrected to the nearest base station whenever possible.

Data Conversion:

As-built survey drawings or hard copy maps that have been field verified can be registered to proper geographic coordinates, utilizing base map information that has a known accuracy that exceeds 10 meters horizontal accuracy at a 95% confidence level per the National Spatial Data Accuracy Standards (NSSDA).

Computer Aided Design (CAD) drawings may also be used as a source of mapping and/or attribute data if the drawings have a reference to the earth's surface such as a Public Land Survey System (PLSS) township, section, and range layer, or any other standard grid for referencing data to the earth's surface. Mapping (GIS) products derived from CAD and/or hardcopy files can be scaled and rotated to base map information that has a known accuracy that exceeds 10 meters horizontal accuracy at a 95% confidence level per the National Spatial Data Accuracy Standards (NSSDA).

Attribute data will need to be cross-walked into the standard database or relational database management system (RDBMS).

Service Area and Water Main Characteristics

FEATURE DATASET: utilities_water

FEATURE CLASS: utility_area

FEATURE ALIAS: Utility Area

DEFINITION: An area of utility company responsibility or an area where special construction precautions are required to prevent damage to underground utility services, differs from Utility Jurisdiction.

OBJECT TYPE: polygon

Water Main Attribute Table Schema

Column Name	Type	Length	Domain_Name (Definition)	Column Definition
Utlresp_id	C	20	N/A	Primary Key. The unique identification number of defined areas of responsibility for utilities.
Util_id*	C	20	N/A	Foreign Key – Links the record to WATUP User's Group Utility Contact Info Table

FEATURE DATASET: utilities_water

FEATURE CLASS: water_line

FEATURE ALIAS: Water Main

DEFINITION: A pipe used to carry water from location to location (main line, service line, vent line, etc).

OBJECT TYPE: polyline

Water Main Attribute Table Schema

Column Name	Type	Length	Domain_Name (Definition)	Column Definition
Watpip_id	C	20	N/A	Primary Key. A unique, user defined identifier for each record or instance on an entity.
Util_id*	C	20	N/A	Foreign Key – Links the record to WATUP User's Group Utility Contact Info Table
Size_d	C	16	D_vpidia (value list – pipe diameter)	The manufacture's designated size, or nominal (i.e. rounded to the nearest unit) diameter for the subject item (e.g. 1'' gas hydrant, 2'' meter, 6'' pipe)
Mat_d	C	16	D_pipmat (material list- pipe)	The material composition of the subject item, such as wood, concrete, steel, cast iron, plastic, etc.
Type_d	C	16	D_pipety (type list – pipe)	The kind, class, or group of the subject item
Use_d	C	16	D_watpip (discriminator – water pipe)	Discriminator. The use code for water pipes.

*Not SDSFIE Compliant

Service Area and Water Main Domain Table Definitions

<u>DOMAIN NAME</u>	<u>TABLE NAME</u>	<u>DEFINITION</u>
value list - pipe diameter	d_vpidia	Allowable input values for pipe diameter
<u>VALUE</u>	<u>DEFINITION</u>	<u>CODE</u>
0.25 inch	1/4 inch (0.25 inch)	0.25
0.5 inch	1/2 inch (0.5 inch)	0.5
0.75 inch	3/4 inch (0.75 inch)	0.75
1 inch	1 inch (1.0 inch)	1
1.25 inch	1 1/4 inch (1.25 inches)	1.25
1.5 inch	1 1/2 inch (1.5 inches)	1.5
1.75 inch	1 3/4 inch (1.75 inches)	1.75
10 inch	10 inch (10.0 inches)	10
12 inch	12 Inch (12.0 inches)	12
14 inch	14 Inch (14.0 inches)	14
15 inch	15 Inch (15.0 inches)	15
16 inch	16 Inch (16.0 inches)	16
18 inch	18 Inch (18.0 inches)	18
2 inch	2 inch (2.0 inches)	2
2.5 inch	2 1/2 inch (2.5 inches)	2.5

20 inch	20 Inch (20.0 inches)	20
21 inch	21 Inch (21.0 inches)	21
22 inch	22 Inch (22.0 inches)	22
24 inch	24 Inch (24.0 inches)	24
28 inch	28 Inch (28.0 inches)	28
3 inch	3 inch (3.0 inches)	3
30 inch	30 Inch (30.0 inches)	30
32 inch	32 Inch (32.0 inches)	32
36 inch	36 Inch (36.0 inches)	36
4 inch	4 inch (4.0 inches)	4
42 inch	42 Inch (42.0 inches)	42
48 inch	48 Inch (48.0 inches)	48
5 inch	5 Inch (5.0 inches)	5
6 inch	6 inch (6.0 inches)	6
60 inch	60 Inch (60.0 inches)	60
72 inch	72 Inch (72.0 inches)	72
8 inch	8 inch (8.0 inches)	8
OTHER	other	OTHER
TBD	to be determined	TBD

DOMAIN NAME
material list – pipe

TABLE NAME
d_pipmat

DEFINITION
Allowable material values for pipe.

<u>VALUE</u>	<u>DEFINITION</u>	<u>CODE</u>
ABS	acrylonitrile butadiene styrene	ABS
AC	asbestos cement	AC
AL	Aluminum	AL
ARMORED GLASS	Armored-glass.	ARMORED_GLASS
ASBESTCEMENT	asbestos cement	ASBESTCEMENT
BI	black iron	BI
BLACK_FE	black iron	BLACK_FE
BRICK	brick	BRICK
C	concrete	C
CASTIRON	cast iron	CASTIRON
CEMENT	cement	CEMENT
CI	cast iron	CI
CIS	Concrete Cast inSitu/Cast in Place	CIS
CM	corrugated metal	CM
COATWRAPSTEL	coated and wrapped steel	COATWRAPSTEL
COMPOSOLITE	Composolite	COMPOSOLITE
CONCRETE	concrete	CONCRETE
CORR_METAL	corrugated metal	CORR_METAL
CORR_STEEL	corrugated steel	CORR_STEEL
	corrugated Aluminum with bituminous coating	
CORRALBITMEN		CORRALBITMEN
CORRALPAVIN	corrugated Aluminum with paved invert	CORRALPAVIN
CORRMETLBITM	corrugated metal with bituminous coating	CORRMETLBITM
CORRMETPAVIN	corrugated metal with paved invert	CORRMETPAVIN
CORRSTELBITM	corrugated steel with bituminous coating	CORRSTELBITM
CORRSTELPAVI	corrugated steel with paved invert	CORRSTELPAVI
CORRUGATEDAL	corrugated Aluminum	CORRUGATEDAL
CRESOTEDWOOD	creosoted wood	CRESOTEDWOOD

CU
 DI
 DUCTILEFE
 FEP TEFLON LINED
 STEEL
 FIBER
 FIBERGLASS
 FIBERGLASS
 REINFORCE
 FIBERGLASS
 REINFORCED
 GALVANIZEDFE
 GALVNIZSTEEL
 GI
 GLASS
 GLASS LINED
 GS
 HASTELLOYS
 HELIWOUND
 HIGH DENSITY
 POLYETH
 INCONEL
 INSULATCONCR
 KYNAR LINED STEEL
 METAL
 MONEL
 MULTIPLECLAY
 MULTIPLETILE
 NICKEL
 OTHER
 OTHERMASONRY
 PFA TEFLON LINED
 PLASTIC
 POLYETHYLENE
 POLYPROPYLENE
 LINED
 POLYSTYRENE
 PRECAST
 PRESTRESSED
 PTFE TEFLON LINED
 PVC
 RC
 REINFORCONCR
 REINFPLASMOR
 RUBBER LINED STEEL
 S
 SARAN LINED
 SINGLE_CLAY
 SINGLE_TILE
 STAINLESS STEEL
 STEEL
 STEEL_WRAPED
 STONE
 TANTALUM LINED

Copper
 ductile iron
 ductile iron
 FEP Teflon-lined steel.
 fiber
 fiberglass
 Fiberglass reinforced polyester.
 Fiberglass Reinforced Vinylester.
 galvanized iron
 galvanized steel
 galvanized iron
 glass
 Glass-lined
 galvanized steel
 Hastelloy
 helically wound
 High Density Polyethylene (HDPE)
 Inconel
 insulating concrete
 Kynar-lined steel.
 metal conduit
 Monel
 multiple clay
 multiple tile
 Nickel
 other
 other
 PFA Teflon-lined.
 plastic
 polyethylene
 Polypropylene-lined steel.
 polystyrene
 precast
 prestressed
 PTFE Teflon-lined.
 polyvinyl chloride
 reinforced concrete
 reinforced concrete
 reinforced plastic mortar
 Rubber-lined steel.
 steel
 Saran lined
 single clay
 single tile
 Stainless steel
 steel
 steel wrapped
 stone
 Tantalum-lined steel

CU
 DI
 DUCTILEFE
 FEPT_STEEL
 FIBER
 FIBERGLASS
 FRP
 FRV
 GALVANIZEDFE
 GALVNIZSTEEL
 GI
 GLASS
 GLASS_LINED
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 POLYSTYRENE
 PRECAST
 PRESTRESSED
 PTFE
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 REINFORCONCR
 REINFPLASMOR
 RUB_STEEL
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 SARAN_LINED
 SINGLE_CLAY
 SINGLE_TILE
 STAINLESS_STEEL
 STEEL
 STEEL_WRAPED
 STONE
 TAN_STEEL

STEEL		
TBD	to be determined	TBD
TERRACOTTA	terra cotta	TERRACOTTA
TILE_RESIN	tile resin	TILE_RESIN
TITANIUM	Titanium	TITANIUM
UNKNOWN	unknown	UNKNOWN
VC	vittrified clay	VC
VITRIFIDCLAY	vittrified clay	VITRIFIDCLAY
WI	wrought iron	WI
WROUGHT_FE	wrought iron	WROUGHT_FE
ZIRCONIUM	Zirconium	ZIRCONIUM

<u>DOMAIN NAME</u>	<u>TABLE NAME</u>	<u>DEFINITION</u>
type list – pipe	d_pipety	Allowable input values for type of pipe.

<u>VALUE</u>	<u>DEFINITION</u>	<u>CODE</u>
BOX	box	BOX
CIRCULAR	circular	CIRCULAR
OTHER	other	OTHER
OVALONGAXHRZ	oval long axis horizontal	OVALONGAXHRZ
OVALONGAXVRT	oval long axis vertical	OVALONGAXVRT
PERFORATPIPE	perforated pipe	PERFORATPIPE
PIPEARCH	pipe arch	PIPEARCH
TBD	to be determined	TBD
UNKNOWN	unknown	UNKNOWN

<u>DOMAIN NAME</u>	<u>TABLE NAME</u>	<u>DEFINITION</u>
discriminator - water pipe	d_watpip	Discriminator - Values that differentiate the general use of a water pipe.

<u>VALUE</u>	<u>DEFINITION</u>	<u>CODE</u>
ABANDONED	abandoned/inactive pipe	ABANDONED
FIRE	fire protection	FIRE
MAIN	main line	MAIN
RAW_WATER	raw water line	RAW_WATER
SERVICE	building/facility service	SERVICE
	siphon line used to transport	
SIPHON	water	SIPHON
SPRINKLER	sprinkler head	SPRINKLER

Additional Considerations

Update/Maintenance: A specific entity shall be identified to ensure that service area and/or water main features are updated and maintained in a timely manner. Following spatial or attribute updates and/or modifications performed to the service area and/or water main data it shall be submitted to the entity responsible for performing quality control practices.

Quality Control: Rigorous quality control techniques shall be implemented to ensure the service area and/or water main features have acceptable horizontal accuracy and attribute integrity. Topology validation must be ensured through the use of common GIS validation techniques.

Metadata: Digital map data intended to meet the standard shall have Federal Geographic Data Committee (FGDC) compliant metadata created for each spatial data file. Compliant metadata shall be provided with Digital Cadastres that are created, updated, or distributed by any parties intended to meet the standard. The metadata shall be supplied anytime it is distributed and/or transferred among participants or other entities responsible for creating, performing quality control on, maintaining, updating, and/or distributing the data. The metadata shall be transferred in a FGDC standard format (i.e. –Z39.5, text, XML, HTML file, etc.) and must have successfully passed through a FGDC compliant metadata parser.

Relationships: To be defined in terms of table joins, topology and relationship classes.

Distribution:
Needs to be discussed

6.0 Procedures

The agency shall be able to demonstrate compliance.

7.0 Revision History

Date	Description of Change
10/1/2003	Draft V1.0 Distributed to WatUp working group
11/14/2003	Added the feature class, attribute and domain table definitions from SDSFIE

8.0 Definitions

Attribute(s) – Properties and characteristics of spatial data entities stored in a database file format or a RDBMS.

Entity – Any object about which an organization chooses to collect data.

Registered – The scaling and rotating of digital map information in 0.0 coordinate system into a known geographic coordinate system.

Topology – Spatial relationships and connectivity among graphic GIS features, such as points, lines, and polygons. These relationships allow display and analysis of “intelligent” data in GIS. Many topological structures incorporate begin and end relationships, direction and right/left identification.

9.0 Related Resources

National Standards for Spatial Data Accuracy (NSSDA):

<http://www.fgdc.gov/standards/documents/proposals/progpas3.html>

Arkansas Standards for Collecting Mapping Grade Global Positioning System Positions

World Wide Web: http://www.gis.state.ar.us/Downloads/LIB/gps_standards.pdf

10.0 Inquiries

Direct inquiries about this standard to:

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Little Rock, AR 72201

<http://www.gis.state.ar.us>

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11.0 Attachments